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JOSEPH E. MUETH

LAW CORPORATION

APPLICATION NO.

FILING DATE

FIRST NAMED INVENTOR

ATTORNEY DOCKET NO.

08/822,932

03/21/97

COOPER

H

279-101

IM51/1214

JOSEPH E MUETH

JOSEPH E MUETH LAW CORPORATION

225 SOUTH LAKE AVENUE, 8TH FLOOR,

PASADENA CA 91101

EXAMINER

DI MAURO, P

ART UNIT

PAPER NUMBER

1754

DATE MAILED:

12/14/98


Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks



Office Action Summary

Application No. 08/822,932	Applicant(s) Cooper
Examiner Peter T. Di Mauro	Group Art Unit 1754



☒ Responsive to communication(s) filed on filing of information disclosure statement on 3/21/97

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-56 is/are pending in the application.

Of the above, claim(s) 1-21 and 45-56 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 22-44 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☒ Claims 1-56 are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

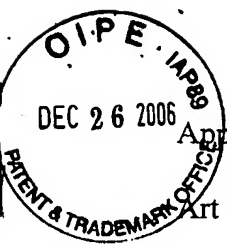
☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---



DETAILED ACTION

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-21, drawn to a method of selectively reducing nitrogen oxides, classified in class 423, subclass 235.
- II. Claims 22-44, drawn to a method of producing ammonia by hydrolyzing urea at 110-200°C, classified in class 423, subclass 358.
- III. Claims 45-56, drawn to a method of conditioning combustion gas to improve particle removal, classified in class 95, subclass 58.

The inventions are distinct, each from the other because:

Inventions I and II, respectively are related as combination and subcombination.

Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because claim 1 constitutes evidence that the combination does not rely upon the specific details of the subcombination for its patentability, because most of the specifics of claim 22 are not present in claim 1. The subcombination has separate utility such as in an overall process of first making ammonia and then using it as a working fluid in a refrigeration system.

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Inventions III and II, respectively are related as combination and subcombination.

Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because claim 45 constitutes evidence that the combination does not rely upon the specific details of the subcombination for its patentability, since most of the specifics of claim 22 are not present in claim 45. The subcombination has separate utility such as in an overall process of making ammonia and then using it as a working fluid in a refrigeration system.

Inventions I and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are not connected in operation and/or effect under the disclosure, since the ammonia is added to flue gas in claim 1 under conditions that selectively reduce NO_x and do not remove particles, whereas the ammonia is added to flue gas in claim 45 under conditions which enhance particulate removal but do not reduce NO_x.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

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During a telephone conversation with Joseph Mueth on 14 May 1998 a provisional election was made with traverse to prosecute the invention of Group II, claims 22-44. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-21 and 45-56 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

Claims 22-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 22, line 4, it is unclear what is the scope of "essentially free". It is suggested that the word "substantially be used in place of "essentially".

In claim 22, line 6, it is unclear what else must be contained in "mixtures containing biuret". Must these mixtures also contain urea? If the latter is applicants' intent, then it is suggested that the phrase "of urea" be inserted after "mixtures".

✓ In claim 22, last 2 lines, it is unclear what is the scope of "controlled pressure and controlled rate of flow". How, precisely, must the pressure and the rate of flow be controlled? Note that the claim already requires the reactor to have a particular temperature and pressure. Would release of ammonia through an orifice of fixed diameter be enough to meet the limitation

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of "withdrawing at a controlled pressure and rate of flow", or is more required? Note that a "controlled" value is not necessarily fixed and unchanging; a value can be "controlled" so as to be constantly changing in some unspecified manner.

Similarly, it is unclear what is the scope of "controlled", in claim 23, step "c".

In claim 24, it is unclear where the claim ends, since there are a multiplicity of periods and a claim should only contain one period.

Furthermore, in claim 24, it is unclear whether the composition chosen to increase the hydrolysis rate can always be one named type, or whether in certain cases a plurality must be chosen. For example, in claim 24, section "c", three components are named, activated carbon, silica and alumina. Must all three be used at once, if sections "c" is chosen?

In claim 26, line 1, it is unclear how "preferred conditions" differ from merely "conditions".

In claim 28, lines 2-5, it is unclear whether the external use of the ammonia must be for both SNCR and SCR, or merely one or the other.

In claim 29, it is unclear whether the ammonia must be used for a process which has both electrostatic precipitators and fabric filters, or merely one or the other.

In claim 33, line 1, it is unclear whether "from" is being misspelled as "form".

In claim 40, the flow rate of gaseous ammonia has to match an "other process employing ammonia". However, it is quite unclear what these other processes are, so therefore it is unclear how the ordinary artisan can determine the flow rate required by the claims.

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In claims 40-41, there is no literal antecedent for the "reactor discharge control valve".

In claim 43, there is no literal antecedent for "the hot combustion gas stream". Where in claim 43 or 22 is there any "combustion gas"?

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 22-28 and 30-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagai (Japanese Patent Publication 08-071,372) in view of von Harpe (US Patent 5240688).

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The Nagai reference is directed to a method of producing gaseous ammonia product from urea, which method comprising feeding an aqueous solution of urea to a heated reactor and therein catalytically hydrolyzing the urea to a gaseous product stream comprising ammonia, carbon dioxide, and water. The hydrolyzed mixture is sent to a gas-liquid separator to separate gaseous ammonia and carbon dioxide from the liquid. The liquid from the gas-liquid separating step is recycled into the hydrolysis catalyst solution holding tank for further hydrolysis of urea. The gaseous ammonia which is separated in the gas-liquid separating step is then fed into a flue gas to reduce the NOx content of the flue gas by selective catalytic reduction (SCR) process. See entire document and abstracts provided.

The Nagai reference does not specifically teach the temperatures of hydrolysis being 110oC-200oC and pressure of 20-500 psig and does not specifically teach treatment of an aqueous solution containing about 1% to about 76% solids.

The von Harpe reference teaches hydrolyzing an aqueous solution of urea under basic conditions, using an alkali metal hydroxide as the catalyst and temperatures of 280°F-370°F (about 137°C to about 188°C). The concentration of urea in the solution is from about 5% to about 45%, which is taken to indicate percent "solids" since an evaporated solution of urea in water leaves solid urea. See column 4, lines 15-69. The pressure of the solution can be as low as about 450 psi (which would be less than 500 psig regardless of whether von Harpe were reporting the pressure as psig (gauge) or psia (atmospheric)); see col. 5, lines 1-10.

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It would have been obvious to one of ordinary skill in the art to have carried out the basic hydrolysis of urea which is taught in Nagai, at substantially the claimed temperatures, pressure, and concentrations, because von Harpe teaches these conditions in order to catalytic hydrolyze urea, for the same purpose of generating ammonia for NOx reduction.

Neither the von Harpe nor the Nagai reference specifically teach removing the gaseous ammonia from the gas-liquid separating step at the "operating temperature" of the hydrolysis reactor. However, it would have been obvious to have conducted this separating step at the operating pressure, rather than at normal atmospheric pressure, because doing so would foster the injection of the ammonia into the flue gas without back flow, and would save energy of re-compression.

As to the limitation that the gaseous ammonia and carbon dioxide are withdrawn at a "controlled pressure and controlled rate of flow", note the following teachings in Nagai. Nagai further teaches that the flow rate of urea solution into the hydrolysis tank is controlled in terms of the amount of NOx contained in the flue gas. Note the Figure on the face of the Japanese Patent Document, especially item 12 (NOx detector) which controls the pumps 8 and 11 delivering urea and its hydrolysis catalyst, as well as the temperature of hydrolysis reactor. See abstracts provided and entire document. In so doing the rate of flow and pressure would be indirectly controlled. Note instant claim 40, which regulates the rate of flow of ammonia from the hydrolysis reactor at a rate "which matches the amount of nitrogen oxides in the combustion gas stream".

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With respect to claim 24, note that both von Harpe and Nagai teach the use of alkali metal hydroxides as urea hydrolysis catalysts. See, e.g., col. 4, lines 45-65 of von Harpe.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagai (Japanese Patent Publication 08-071,372) in view of von Harpe (US Patent 5240688) as applied to claim 22-28 and 30-44 above, and further in view of Christiansen (WO 94/13391).

The previously-cited references do not literally use the product gaseous ammonia for conditioning combustion gas so as to improve removal of particulates in electrostatic precipitators.

The Christiansen reference teaches a process for improving the performance of an electrostatic precipitator in removing particulates, which process involves adding gaseous ammonia to a combustion effluent. See page 1, line 20-page 3, line 25. The reference suggests introducing the hydrolysis products of urea as a substitute for ammonia, at page 9, lines 10-20. The advantage of hydrolyzing urea rather than adding ammonia is the relative stability, safety and economy of urea for transport and storage. See page 13, lines 20-30. It would have been obvious to have chosen the "end-use" of instant claim 29, for the ammonia product generated by the above-combined references, because Christiansen teaches that the advantage of hydrolyzing urea rather than adding ammonia is the relative stability, safety and economy of urea for transport and storage, in a process of adding ammonia to improve the performance of an electrostatic precipitator in removing particulates.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter DiMauro whose telephone number is (703) 308-0680. The examiner can normally be reached from 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lewis, can be reached on (703) 308-2535.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0662.

PD

PD:December 8, 1998

Michael Lewis
Supervisory Patent Examiner
Technology Center 1700

March 2, 99
10:00 AM
Crystal Plaza 3
Receptionist 8th Floor
FAX 703 305 6078



Mail to
Applicant

279-101

as Part of Paper

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
HAL COOPER

Serial No.: Not Assigned

Filed: Herewith

For: METHODS FOR THE PRODUCT-
ION OF AMMONIA FROM UREA
AND/OR BIURET, AND USES FOR
NO_x AND/OR PARTICULATE MATTER
REMOVAL

Group Art Unit: Not Assigned
Examining Attorney:
Not Assigned

Date: March 21, 1997
Pasadena, California

INFORMATION DISCLOSURE STATEMENT

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Attached are the following:

Examiner's Initials

DATE

PP	Mavrovic	7/1974	United States Patent No. 3,826,815
PP	Van Moorsel	11/1975	United States Patent No. 3,922,222
PP	Lyon	8/1975	United States Patent No. 3,900,554
PP	Schell I	5/1976	United States Patent No. 4,087,513
PP	Schell II	9/1977	United States Patent No. 4,168,299
PP	Pence, et al	9/1980	United States Patent No. 4,220,632
PP	Altman, et al	8/1985	United States Patent No. 4,533,364
PP	Miller, et al	7/1991	United States Patent No. 5,034,030
PP	von Harpe, et al	4/1992	United States Patent No. 5,240,688
PP	Young	12-1993	United States Patent No. 5,252,308

<u>Class</u>	<u>SUB</u>
423	356
210	769
423	235
423	358
423	358
423	237
95	58
95	279
423	235
423	358

1

Examiner's Name
Peter DiMuro

Considered on
9/1998

Examiner Initial

Date

Class	SUB
423	235
423	235
95	3

PR
PR
PR

Jones

1-1994

United States Patent No. 5,281,403

Hofmann, et al 8-1996

United States Patent No. 5,543,123

Lookman, et al 10-1996

United States Patent No. 5,567,226

Mavrovic relates to a method wherein ammonia is recovered from a waste, liquid effluent comprising a weak ammoniacal aqueous solution containing ammonia and/or ammonium carbamate or ammonium carbonate by stripping the solution with steam and an inert gas in a fractionator at specified conditions. Substantially all of the ammonia is recovered in an overhead gaseous product and a bottoms liquid product which is essentially condensate substantially free of ammonia is also recovered.

Lyon in U.S. Patent No. 3,900,554 describes a process in which ammonia is used to reduce nitrogen oxide concentrations in combustion exhaust gas streams for use with the so called SNCR (Selective Non-Catalytic Reduction) method. In U.S. Patent No. 4,220,632, Pence, et. al. describes a process in which ammonia is used to reduce nitrogen oxides in combustion exhaust gas in the presence of a catalyst by the SCR (Selective Catalytic Reduction) process.

Van Moorsel describes a procedure in which the condensate from a urea crystallizer is directed to a low pressure boiler or heat exchanger and evaporated to accomplish thermal decomposition of urea and any biuret contained therein into ammonia and carbon

Examiner's Name

Peter

²
Considered on
9/1998



DEC 26 2006

Notice of References Cited

Application No.

08/822932

Applicant(s)

Cooper

Examiner

DiMaggio

Group Art Unit

1754

Page 1 of 1

U.S. PATENT DOCUMENTS

*	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	4,308,385	12-1981	Goorden	423	358
B	4,652,678	3-1987	Dowles	423	358
C	5,098,680	3-1992	Fellows	423	235
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

*	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N	08-057,258	3-1996	Japan	Babcock-Hitachi	—	—
O	08-071,372	3-1996	Japan	Nagai	—	—
P	94/13391	6-1994	PCT	Christiansen	—	—
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

*	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
X		

* A copy of this reference is not being furnished with this Office action.
(See Manual of Patent Examining Procedure, Section 707.05(a).)

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